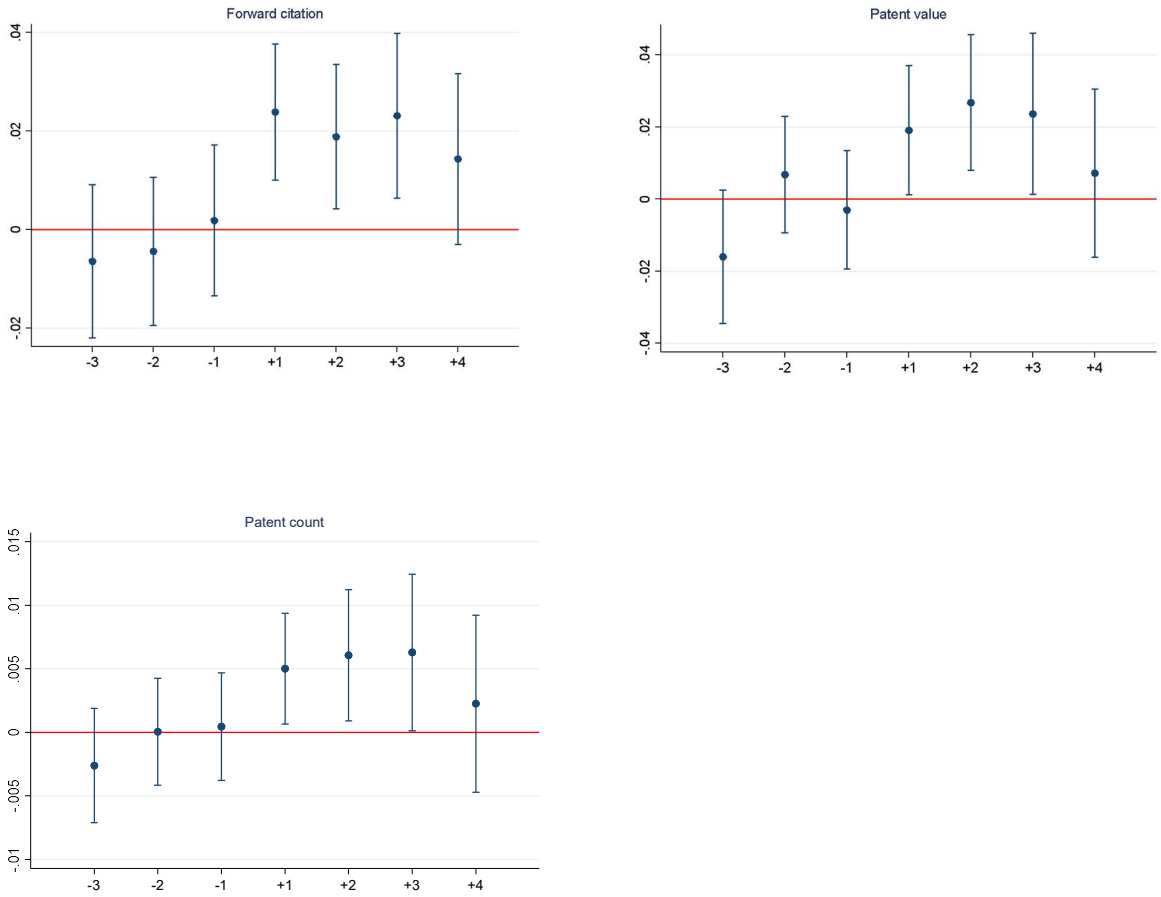
Internet Appendix for "Innovation under Pressure"

Figure IA.1

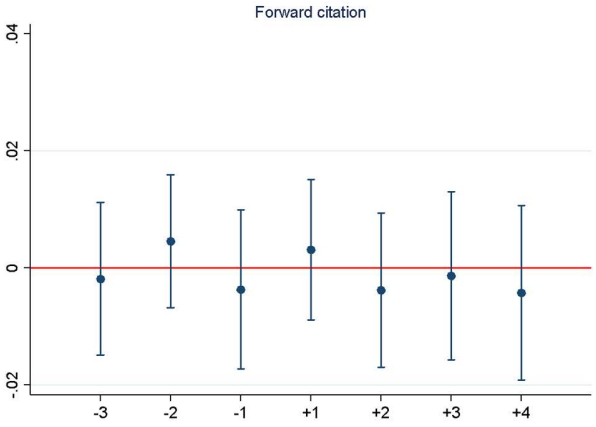
Dynamics of Subsamples based on Innovative Efficiency

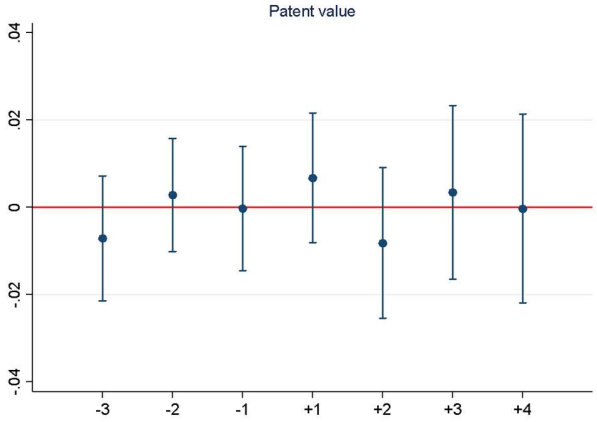
This figure presents the dynamics of the effects of EPS-motivated buybacks on innovation outputs across two subsamples: high innovative efficiency firms (Panel A), and low innovative efficiency firms (Panel B). Innovative efficiency is defined as the log of one plus the number of patents filed by a firm minus the log of one plus a firm's R&D capital (estimated as the five-year sum of a firm's annual R&D expenditures with an obsolescence rate of 15%). The high and low subsamples include firms with innovative efficiency above and below the sample median, respectively. The outcome variables after the focal quarter are measured as a difference by comparing the innovation outputs in the first, second, third, and fourth year after the focal quarter, to the four quarters before the focal quarter for firms just below the zero pre-repurchase EPS surprise threshold compared to firms just above this threshold. The outcome variable before the focal quarter is measured as a difference by comparing the innovation outputs in the first, second, and third years before the focal quarter to the previous year. Standard errors are clustered at the firm level, and 95% confidence interval is presented in the figure.

Panel A: Dynamics – High innovative efficiency firms



Panel B: Dynamics – Low innovative efficiency firms





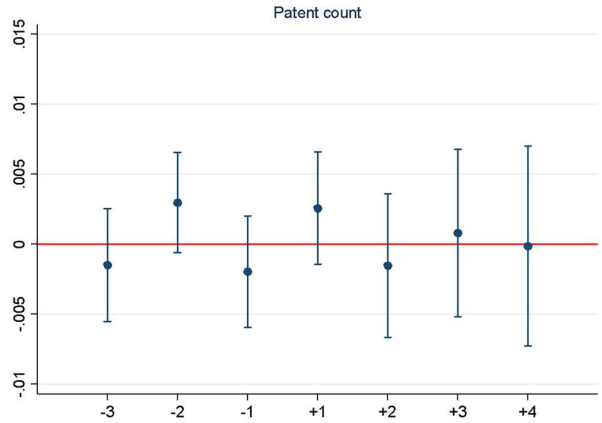


Table IA.1

Pre-repurchase EPS surprise and Share Repurchases

This table presents results on the relation between accretive share repurchases and having a negative pre-repurchase EPS surprise. Net repurchases are defined as in Fama and French (2001). Accretive repurchases are defined as buybacks that increase the firm's EPS by at least one cent. All other variables and the methodology are described in Table 2. Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Full sample

	(1)	(2)
Dependent variable	Net Repurchases	I[Accretive Repurchases]
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0038***	0.0555***
	(0.0005)	(0.0076)
Linear controls in pre-repurchase EPS surprise	Y	Y
Time fixed effects	Y	Y
N	22,688	22,759
R^2	0.0537	0.0333

Panel B: High innovation diversity

	(1)	(2)
Dependent variable	Net Repurchases	I[Accretive Repurchases]
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0028***	0.0461***
	(0.0006)	(0.0100)
Linear controls in pre-repurchase EPS surprise	Y	Y
Time fixed effects	Y	Y
N	10,972	11,010
R^2	0.0552	0.0371

Panel C: Low innovation diversity

	(1)	(2)
Dependent variable	Net Repurchases	I[Accretive Repurchases]
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0048***	0.0692***
	(0.0007)	(0.0108)
Linear controls in pre-repurchase EPS surprise	Y	Y
Time fixed effects	Y	Y
N	11,034	11,065
R^2	0.0605	0.0406

Table IA.2

Alternative Innovation Output Measures

This table presents results based on Table 2 using alternative measures of innovation outputs. Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	(1) Forward citations (tech class adjusted)	(2) Forward citations (section adjusted)	(3) Value of patents (market-adjusted)	(4) Value of patents (SIC2 adjusted)
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0136***	0.0152***	0.0119**	0.0119**
	(0.0050)	(0.0048)	(0.0060)	(0.0058)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y
N	22,061	22,061	22,061	22,061
R^2	0.0314	0.0222	0.0255	0.0273

Table IA.3

Dynamics over Longer Horizons

This table presents longer time-series dynamics of the estimated effects from Table 2. Panel A examines the future dynamics, and the outcome variables are measured as a difference by comparing the innovation outputs in the first, second, third, and fourth years after the focal quarter to the four quarters before the focal quarter. Panel B examines pre-existing trends, and the outcome variables are measured as a difference by comparing the innovation outputs in the first, second, and third year before the focal quarter to the previous year. All other variables and the sample are as described in Table 2. Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Dynamics over four years

	(1)	(2)	(3)	(4)
Forward citations	*t*+1	*t*+2	*t*+3	*t*+4
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0137***	0.0088*	0.0114**	0.0060
	(0.0045)	(0.0048)	(0.0055)	(0.0058)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y
N	22,061	21,241	20,356	19,204
R^2	0.0186	0.0336	0.0581	0.0793

	(1)	(2)	(3)	(4)
Value of patents	*t*+1	*t*+2	*t*+3	*t*+4
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0125**	0.0084	0.0136*	0.0032
	(0.0057)	(0.0064)	(0.0075)	(0.0082)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y
N	22,061	21,241	20,356	19,204
R^2	0.0267	0.0747	0.1511	0.1918

	(1)	(2)	(3)	(4)
Number of patents	*t*+1	*t*+2	*t*+3	*t*+4
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0038***	0.0028	0.0040*	0.0016
	(0.0015)	(0.0019)	(0.0022)	(0.0026)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y
N	22,061	21,241	20,356	19,204
R^2	0.0367	0.0898	0.1524	0.1877

	(1)	(2)	(3)	(4)
R&D	*t*+1	*t*+2	*t*+3	*t*+4
$I_{\text{Negative pre-repurchase EPS surprise}}$	-0.0003**	-0.0011	-0.0016***	-0.0025***
	(0.0002)	(0.0005)	(0.0006)	(0.0007)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y	Y
Time fixed effects	Y	Y	Y	Y
N	22,061	21,241	20,356	19,204
R^2	0.0501	0.0270	0.0275	0.0259

Table IA.3, continued.

Panel B: Pre-existing trends

Forward citations	(1) *t*-1	(2) *t*-2	(3) *t*-3
$I_{\text{Negative pre-repurchase EPS surprise}}$	-0.0031	-0.0008	-0.0005
	(0.0050)	(0.0047)	(0.0049)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y
Time fixed effects	Y	Y	Y
N	21,856	21,540	20,792
R^2	0.0148	0.0075	0.0129

Value of patents	(1) *t*-1	(2) *t*-2	(3) *t*-3
$I_{\text{Negative pre-repurchase EPS surprise}}$	-0.0099*	0.0053	-0.0026
	(0.0057)	(0.0051)	(0.0053)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y
Time fixed effects	Y	Y	Y
N	21,856	21,540	20,792
R^2	0.0133	0.0103	0.0115

Number of patents	(1) *t*-1	(2) *t*-2	(3) *t*-3
$I_{\text{Negative pre-repurchase EPS surprise}}$	-0.0018	0.0014	-0.0006
	(0.0015)	(0.0014)	(0.0014)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y
Time fixed effects	Y	Y	Y
N	21,856	21,540	20,792
R^2	0.0167	0.0119	0.0132

R&D	(1) *t*-1	(2) *t*-2	(3) *t*-3
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0001	-0.0004	-0.0001
	(0.0002)	(0.0002)	(0.0002)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y
Time fixed effects	Y	Y	Y
N	21,856	21,540	20,792
R^2	0.0218	0.0459	0.0346

Table IA.4

Changes to Employment and Plants

This table presents the estimated effects on the number of employees and on the separation of plants within the sample of high-innovative-efficiency firms that we can link to the NETS. The unit of observation in each regression is plant-year. Dependent variables are the difference in the number of employees, scaled by the pre-focal-year employment (column 1), and an indicator for whether a plant was separated (sold or closed) in the three years after the focal year (column 2). All other variables and the sample construction are described in Table 2. Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Dependent variable	Employees	Plant Separation
$I_{\text{Negative pre-repurchase EPS surprise}}$	-0.0374*	0.0256*
	(0.0223)	(0.0152)
Linear controls in pre-repurchase EPS surprise	Y	Y
Time fixed effects	Y	Y
Industry-year fixed effects	Y	Y
N	245,147	274,372
R^2	0.1425	0.3415

Table IA.5

Test for Potential Contemporaneous Effect

This table presents the estimated potential contemporaneous effect around the discontinuity. Dependent variables are the differences in the outcome variables between the focal quarter and the pre-period (the average over four quarters before the focal quarter). Total accruals are measured as the absolute value of total accruals divided by lagged assets. Discretionary accruals are measured in absolute value using the modified Jones (1993) model of Dechow, Sloan, and Sweeney (1995). Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dependent variable: Contemporaneous	R&D	Total accruals	Discretionary accruals
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0001	-0.0006	0.0008
	(0.0002)	(0.0009)	(0.0008)
Linear controls in pre-repurchase EPS surprise	Y	Y	Y
Time fixed effects	Y	Y	Y
N	22,061	20,675	20,675
R^2	0.1884	0.5338	0.2875

Table IA.6

Risk of Innovation Projects

This table presents the estimated effects on the riskiness of innovation projects in the full sample (Column 1), and separately within subsamples formed based on the firm's innovative efficiency (measured before the focal quarter) in Columns 2 and 3, respectively. We follow Amore et al. (2013) and Mukherjee et al. (2017) to measure innovation risk as the standard deviation of citations. The dependent variables are the difference in these outcome variables between the pre- and post-period (the average from four quarters before to four quarters after the focal quarter). Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dependent variable:		High	
Standard deviation of citations		Innovative	Low Innovative
	Full sample	Efficiency	Efficiency
$I_{\text{Negative pre-repurchase EPS surprise}}$	0.0165	-0.0099	0.0355
	(0.0180)	(0.0274)	(0.0279)
Linear controls			
in pre-repurchase EPS surprise	Y	Y	Y
Time fixed effects	Y	Y	Y
N	22,061	10,065	10,161
R^2	0.0301	0.0298	0.0392